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The following information is taken from the documentation as supplied by the applicant.

54 Process, device and system for pulling off a tape which has been adhered to a wall .

57 In the process to pull off an adhesively adhered tape which has been adhered to the wall of a body, especially bus or vehicle walls and especially protective tapes against graffiti and/ or advertising tapes, it is proposed, that the tape is continuously heated in sections and pulled off the wall at an angle to then be wound up to form a coil.

The invention covers a device to carry out the process and the systems holding this device.

Description

The invention is directed towards a process to pull off the wall an adhesively adhered tape which has been adhered to the wall of a body, especially bus or vehicle walls and especially protective tapes against graffiti and/ or advertising tapes.

From DE 195 30 755.0 is known a process to apply adhesively coated tape for protection against graffiti and the like to walls of busses or vehicles. It is then necessary to remove these tapes after a certain duration from the walls in an economic way.

It is the purpose of this invention to give a process which makes this possible.

The problem is solved by continuously heating the film in sections and to continuously pull off the tape from the wall under an angle and to coil up the tape.

Here it becomes necessary to apply the heat uniformly over the area of removal without melting or burning of the tape.

The tape film can consist of one layer or may be built as a sandwich, possibly with an in-between adhesive layer. It is preferred, for two layer films to pull off and coil the outer layer after heating it separately from the inside layer. It is practical for two layers, that each layer is pulled off and coiled at a different speed.

It has been found practical to apply the heat through infrared radiation from the outside of the tape.

Here it is again practical to adjust the wave length of the radiation to the adsorption of the adhesive layer which holds the film to the wall. As little heat as possible should be taken up by the actual tape body.

For metal walls it is possible to apply the heating to the tape through induction heating from the base.

It can further be of advantage for controlling the heating, if there before, simultaneously or afterwards is applied contact heating e. g. from hot water.

In all cases, it is desirable to apply the heating over a large area.

The invention is also directed towards a device to pull off the wall an adhesively adhered tape which has been adhered to the wall of a body, especially bus or vehicle walls and especially such protective tapes against graffiti and/ or advertising tapes.

This device according to the invention is recognized by the feature, that on a basic winding element, that can be moved along the wall

with at least one coiling element with its axis parallel to the wall is mounted a basic heating element which can be moved along the tape covered wall such, that by pushing of the heating device and the coiling mechanism along the wall, it is possible, to continuously heat the tape in sections and to pull off the tape at an angle from the wall.

The sub -claims 10 - 18 cover advantageous embodiments for the device.

The invention is also directed towards a system to apply an adhesively adhered tape which can be adhered to the wall of a body, especially bus or vehicle walls and especially such protective tapes against graffiti and/ or advertising tapes.

According to the invention is contemplated a pull-off device according to one of the claims 9 -18 and one carrier of the device which can be moved along the wall, where the device carrier also can be adjusted with respect to the height of the coiling spool in relation to the wall.

This makes it possible to remove the tape from the wall at different heights using the same device carrier.

The system can be be constructed simply, when one as device carrier uses one of the generally known equipments consisting of at least one drive unit, a height adjustable basket elevator unit with a control unit and a carrier for the device fastened to the basket unit.

For further ease of height adjustment, the device carrier can be fastened to the basket through a second elevation adjustment system.

The invention is now explained further through attached illustrations. Shown are:

Fig. 1 a sketch showing a front view of a system to pull off adhered tapes from a wall consisting of a pulling device and a driven device carrier.

Fig. 2 the device carrier in its base position.

Fig. 3 the device carrier in its top working position.

Fig. 4 a device with two coiling stations for removing a two layer tape.

According to Fig. 1 the system has a driven device carrier 1 and a pull-off device 2 carried thereby. In the example shown, the device carrier is a lift basket unit

The lift basket unit 1 has a drive unit 3 with wheels 4 and with at least one directional wheel 5. Further, there is on the control unit, a

power block 6 and an energy system 7 (compare sketches Fig. 2 and 3). On the drive unit there is a column lift drive 8, by which the operation basket 9 can be height adjusted. At the operation basket 9 there is a pneumatic lift 10 by which the device carrier 11, carrying the pull-off device 2, can be further adjusted with respect to height. In Fig. 2 the column lift 8 and the pneumatic lift 10 are at their base position; in Fig. 3 both lifts are in their top position so that the device holder 11 is at its top working position. Using the system as shown in Fig. 1 the working area as defined in Fig. 2 and 3 by the broken lines can be covered by moving the drive unit 3 and by activating the lifts 8 and 10.

The pull-off unit 2 consists of a base element 12 and of a connected linear infrared heat source lined up with the tape coated wall. The heat source extends parallel and vertically and consists of one or several radiation elements 13a and their matched reflectors 13b. The radiation direction S can be adjusted in the horizontal plane. The infrared radiation should preferentially heat the adhesive layer KS of the tape F at the wall and not the single or multi layer tape base FG, except where the tape base can tolerate much heat without becoming too weak to accomplish the coiling process. In Fig. 1 the two tape parts on the wall are shown with exaggerated thicknesses.

Further, there is on the base element 12 a coiling unit 44 with a vertical axis. This has a coiling core 15 with a clamp 16. The core is driven through a slide coupling (not shown) by a motor 17.

At start of the process the device carrier 1 is moved to the end of the to be removed tape F, and the end of the tape is loosened manually or by other means to the extend, that the total tape width can be connected by the clamp 16 to the coiling core 15.

Then the infrared radiator 13 is turned on without starting the drive 6. After the adhesive layer has been heated to the extend, that it can be loosened from the vehicle wall, the drive 6 of the device carrier 1 and the motor 17 are started, so that during motion of the device carrier 1 in the drive direction FR under continuous heating of the tape, one can pull off the tape and coil it on the core 15. It is clear, that one for each specific adhesive tape must determine the relationship between process rate (introduction of heat and softening of the adhesive) and drive speed, to avoid tearing the tape during pull-off.

The invention example 2' shown in Fig. 4 serves to remove a tape F

which consists of two layers L.1 and L.2 and an adhesive layer KS. Possibly the two layers L.1 and L.2 are held together by an in-between adhesive layer (not shown). The layers L.1 and L.2 consist of different materials and can exhibit different tear strengths. The layer L1 is the actual transparent anti-graffiti layer, while the layer L.2 can be a much softer color layer.

For the separate coiling of both layers two separate coiling elements 14 and 14' are mounted on the base coiling device holder 12A. The arrows P and P' indicate, that the coiling elements 14 and 14' are held independently and can be adjusted independently parallel to the wall.

On a heating element 12B which can be moved on its own drive unit, but is coupled to the coiling element 12B or is integrated into it, is mounted a large area infrared heating unit 13', which heats an area of e. g. 1m x 1m of the tape to be removed to a temperature of e. g. 50- 55 C°. The heating depends upon the condition of the backing of the tape to be removed.

After heating, the device 2' is moved so much, that the free end of layer L1 can be taken up by the coiling unit 14' ; and the free end of the layer L2 can be taken up by the coiling unit 14. The softer layer L2 needs a certain time to cool before being pulled off.

Since the coiling devices are driven separately the coiling can be accomplished at different coiling speeds. During the coiling,the two coiling elements 14 and 14' can be displaced independently along the wall on the base element 12a without need to drive the device carrier 1. The force for the displacements is delivered by the coiling elements 17 and 17'. e. g. the coiling devices, are pulled in direction towards the not yet heated tape parts.

Also, for the design with only one coiling element, it can be of advantage to incorporate the above described displacement capability.

Patent claims

1 A process to pull off an adhesively adhered tape which has been adhered to the wall of a body, especially bus or vehicle walls and especially protective tapes against graffiti and/ or advertising tapes recognized by the feature, that the tape is continuously heated in sections and continuously pulled off the wall at an angle to then be wound up to form a coil.

2. A process according to claim 1, recognized by the feature, that for removal of a two layer tape, after heating is pulled off and coiled first the outer layer separately from the inner layer.

3. A process according to claims 1 or 2, recognized by the feature, that both layers are coiled at different rates.

4. A process according to at least one of the claims 1-3, recognized by the feature, that the tape is heated by infrared radiation from the outside.

5. A process according to at least one of the claims 1-4, recognized by the feature, that infrared radiation of a wave length is used which is adjusted to match the absorption of the adhesive layer holding the tape to the wall.

6. A process according to at least one of the claims 1-5, recognized by the feature, that the tape is heated by induction heating from the backside.

7. A process according to at least one of the claims 1-6, recognized by the feature, that after or simultaneously to application of radiation heating also is used contact heating.

8. A process according to at least one of the claims 1-7, recognized by the feature, that the tape is heated over a large area.

9. A device to pull off the wall an adhesively adhered tape with at least one layer, which has been adhered to the wall of a body, especially bus or vehicle walls and especially protective tapes against graffiti and/ or advertising tapes, recognized by the feature, that on a basic winding element (12A) , that can be moved along the wall, is at least one coiling element (14) with an axis generally parallel to the wall and with a basic heating element (12B) and a heating unit (13) directed towards a section of the adhesively taped wall, where, by pushing of the heating device and the coiling mechanism along the wall, it is possible, to continuously heat the tape (F) in sections and to pull off the tape at an angle from the wall.

10. A device according to claim 9, recognized by the feature, that the coiling element (12A) and the basic heating element (12B) are united to one basic element (12).

12. A device according to claim 9 or 10, recognized by the feature, that the heating element is an infrared radiation source (13).

13. A device according to one of the claims 9-12, recognized by the feature, that the coiling element (12A) consists of at least two independently driven coiling elements (14, 14').

14. A device according to one of the claims 9-13, recognized by the feature, that the coiling elements (14, 14') on the coiling element (12A) can be adjusted parallel to the wall.

15. A device according to one of the claims 9-14, recognized by the feature, that the rotation rate and /or direction of the coiling elements (14, 14') can be adjusted .

16. A device according to one of the claims 9-15, recognized by the feature, that the coiling elements (14, 14') can be displaced along the wall independently from each other.

17. A device according to one of the claims 9-16, recognized by the feature, that the coiling element (14) at the core (15) has a clamping device (16) which can hold that end of the tape which at the beginning of the pulling-off process has been loosened from the wall .

18. A device according to at least one of the claims 9-17, recognized by the feature, that the wall and the coiling axis are aligned vertically.

19. A system to pull off the wall an adhesively adhered tape with at least one layer, which has been adhered to the wall of a body, especially bus or vehicle walls and especially protective tapes against graffiti and/ or advertising tapes, recognized by the feature, that it consists of a pull-off device (2) according to one of the claims 9-18 and of a device carrier (1) which can travel along the wall (W) whereby one can adjust the height of the coil with respect to the wall.

20. A system according to claim 19 recognized by the feature, that the device carrier (1) is a known type lift basket unit which at least consists of a drive unit (3), an operation basket (9) with an operation control, a height adjustment by a column lift drive (8) and a mounting unit (11) for the device (2).

21. A system according to claim 20 recognized by the feature, that the mounting unit (11) for the device (2) is attached to the lift basket

through a second lift system (10).

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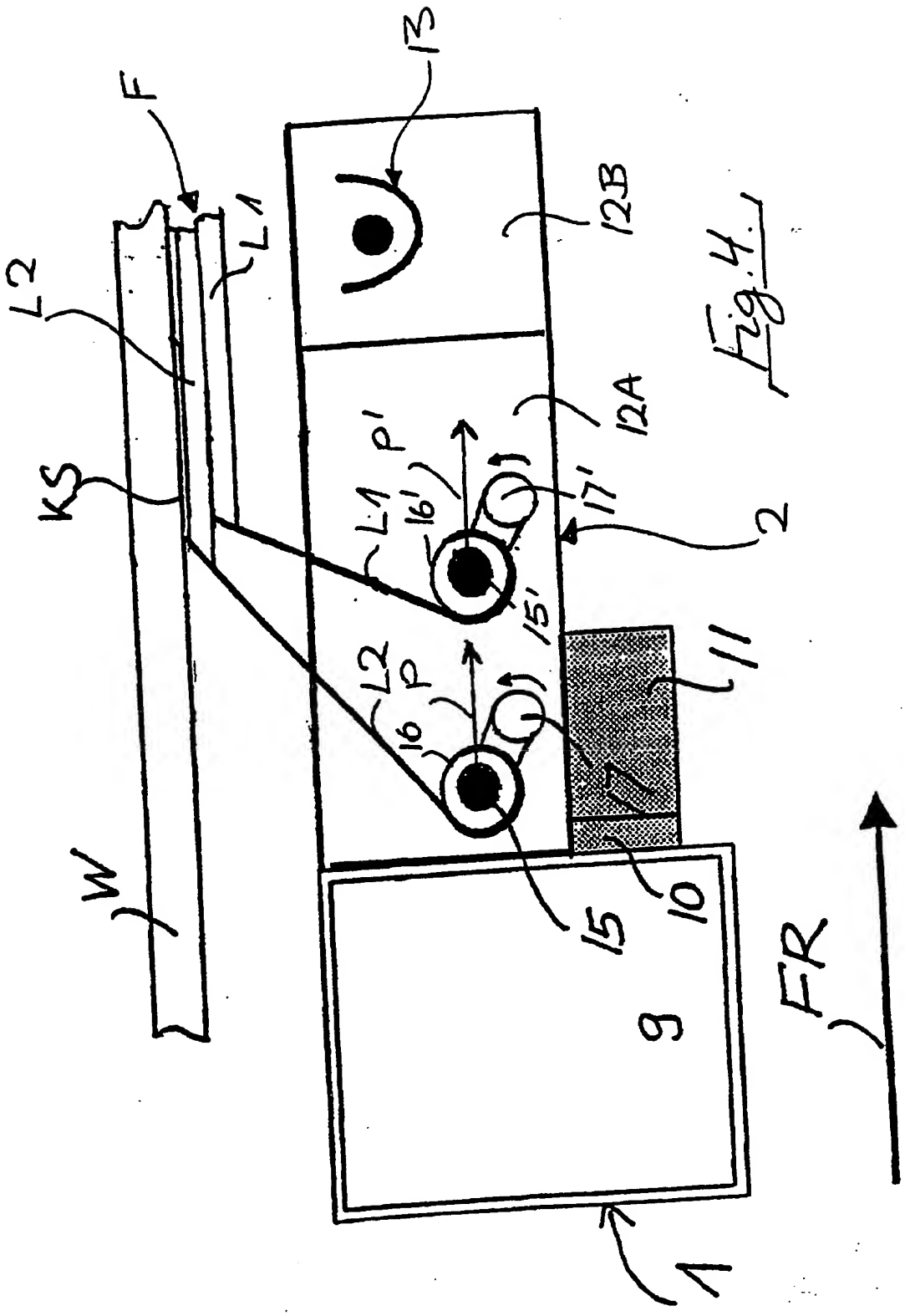

Fig. 4.

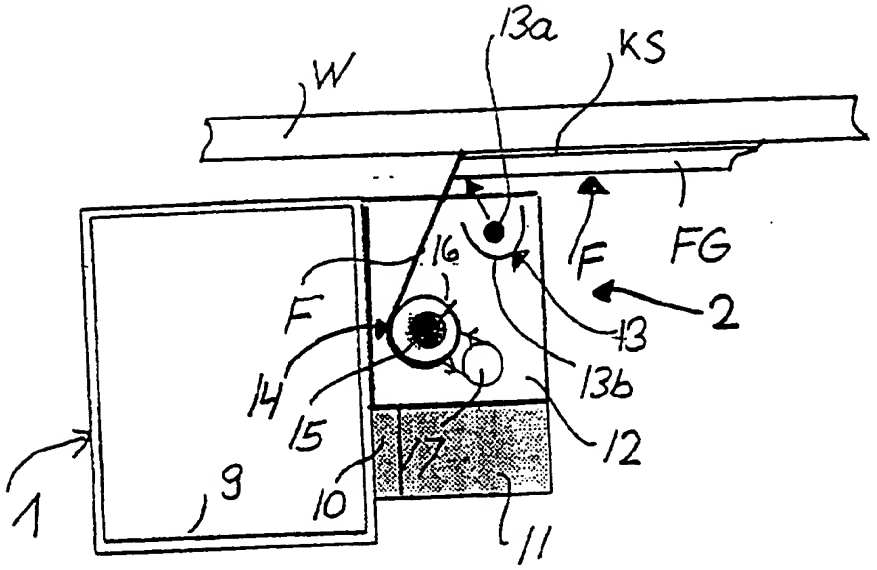

Fig. 1.

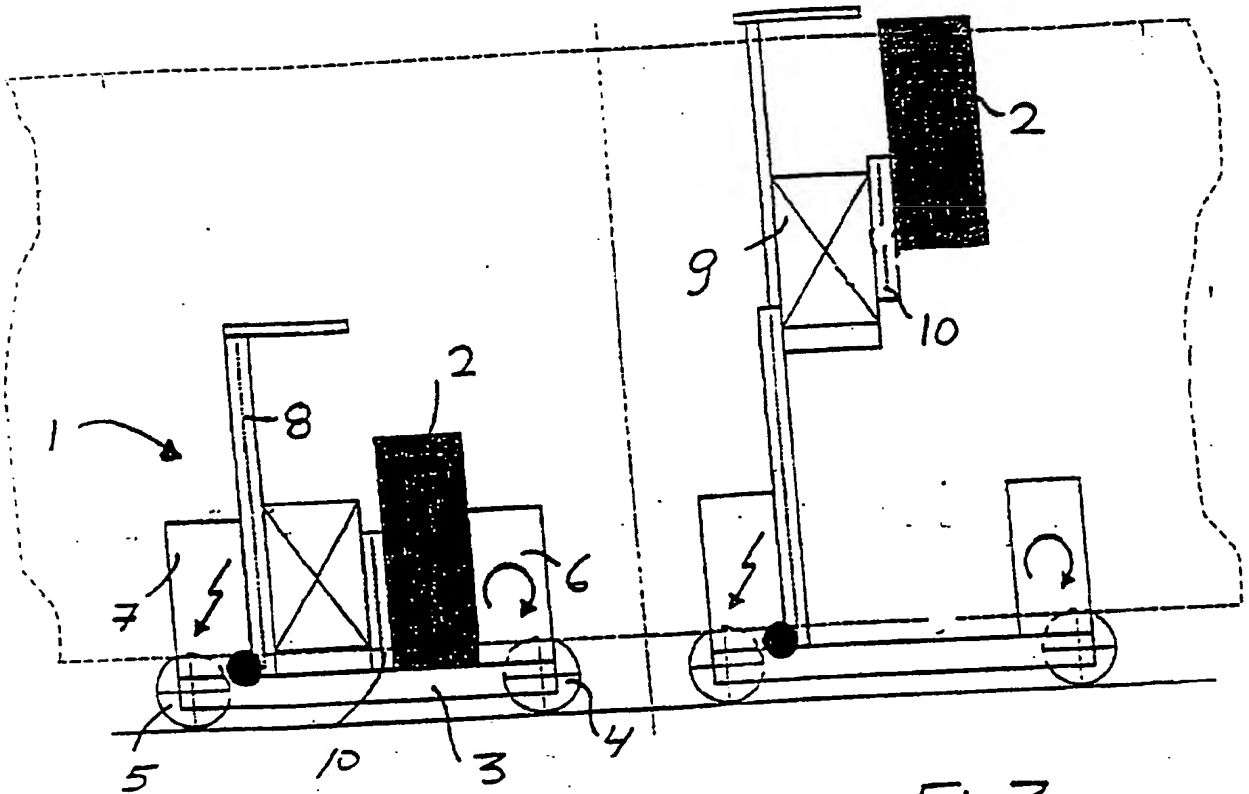

Fig. 2.

Fig. 3.